E85 – A Clean Alternative Fuel Option NOW

CEC Meeting Sacramento, CA September 29, 2005

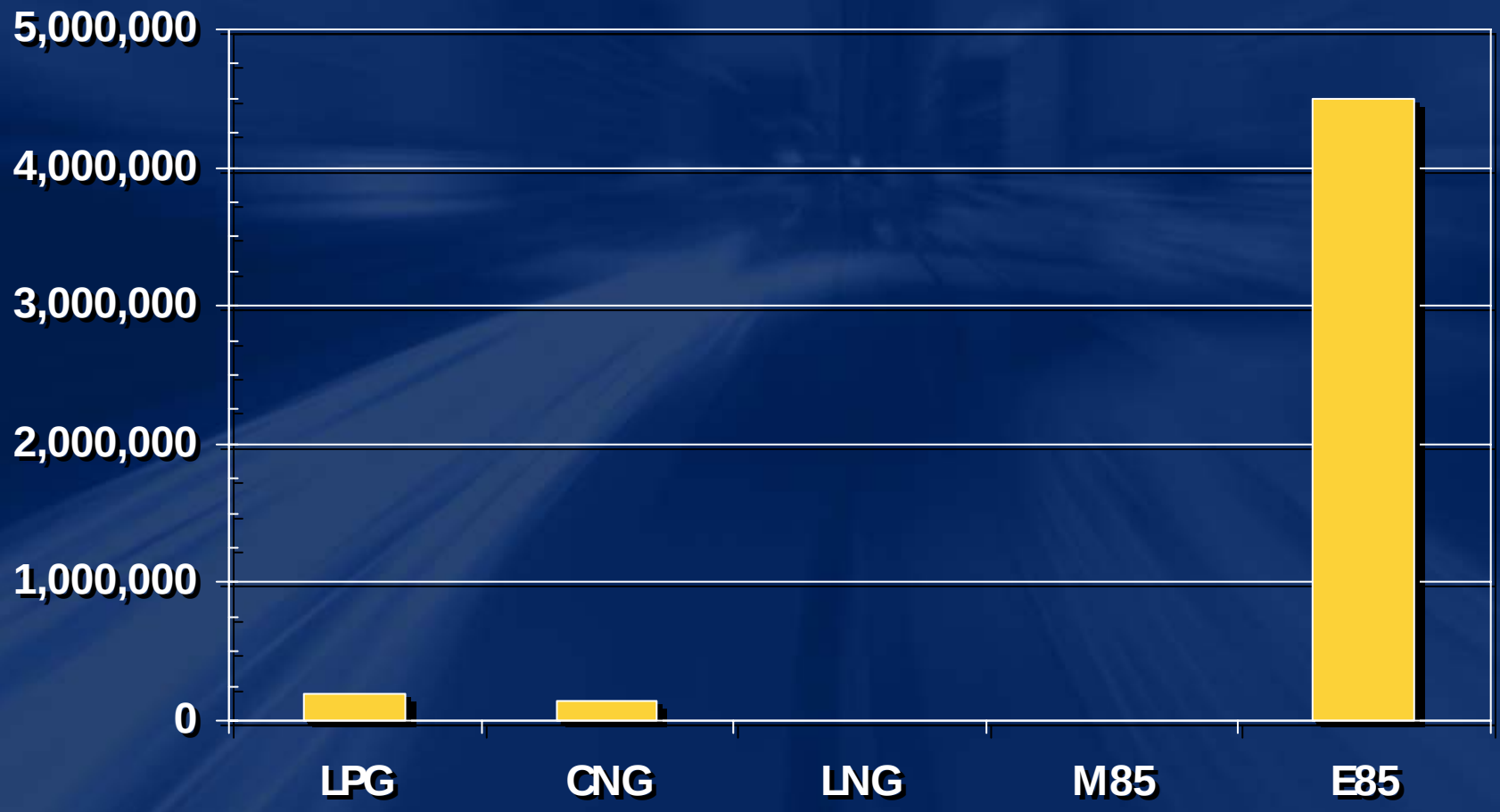
E85 Opportunity

E85 compatible vehicles are here now

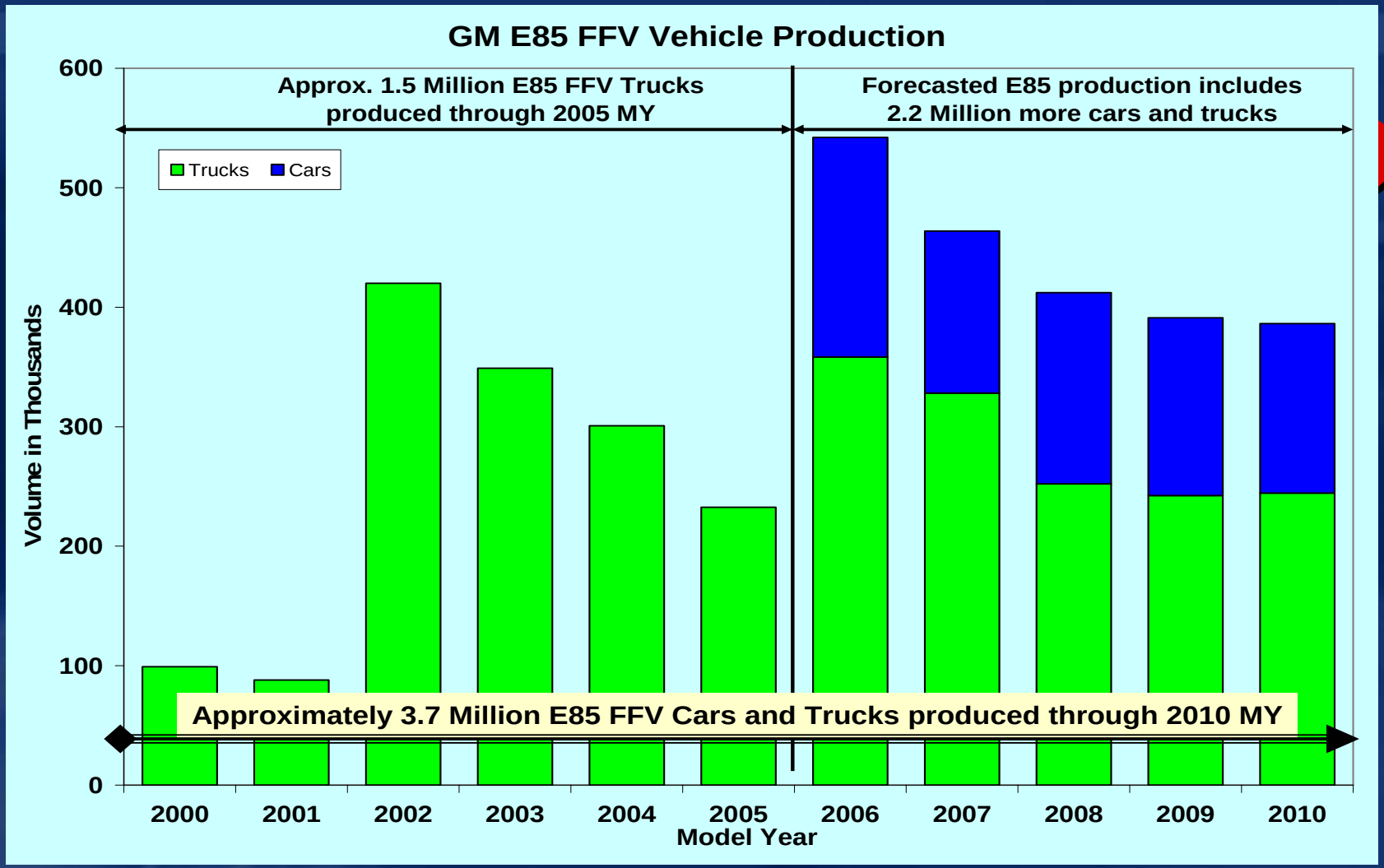
Large number of E85 flex-fuel vehicles in U.S. fleet:

- Option to obtain CAFE credits since 1993
- Total volume of over 4 million cars and trucks today
- The only alternative fuel where usual chicken – egg hurdle is a non-issue

U.S. fleet total alternative fuel vehicle populations



GM E85 FFV Vehicle Production



2006 Chevrolet E85 Flex Fuel Vehicles

Avalanche

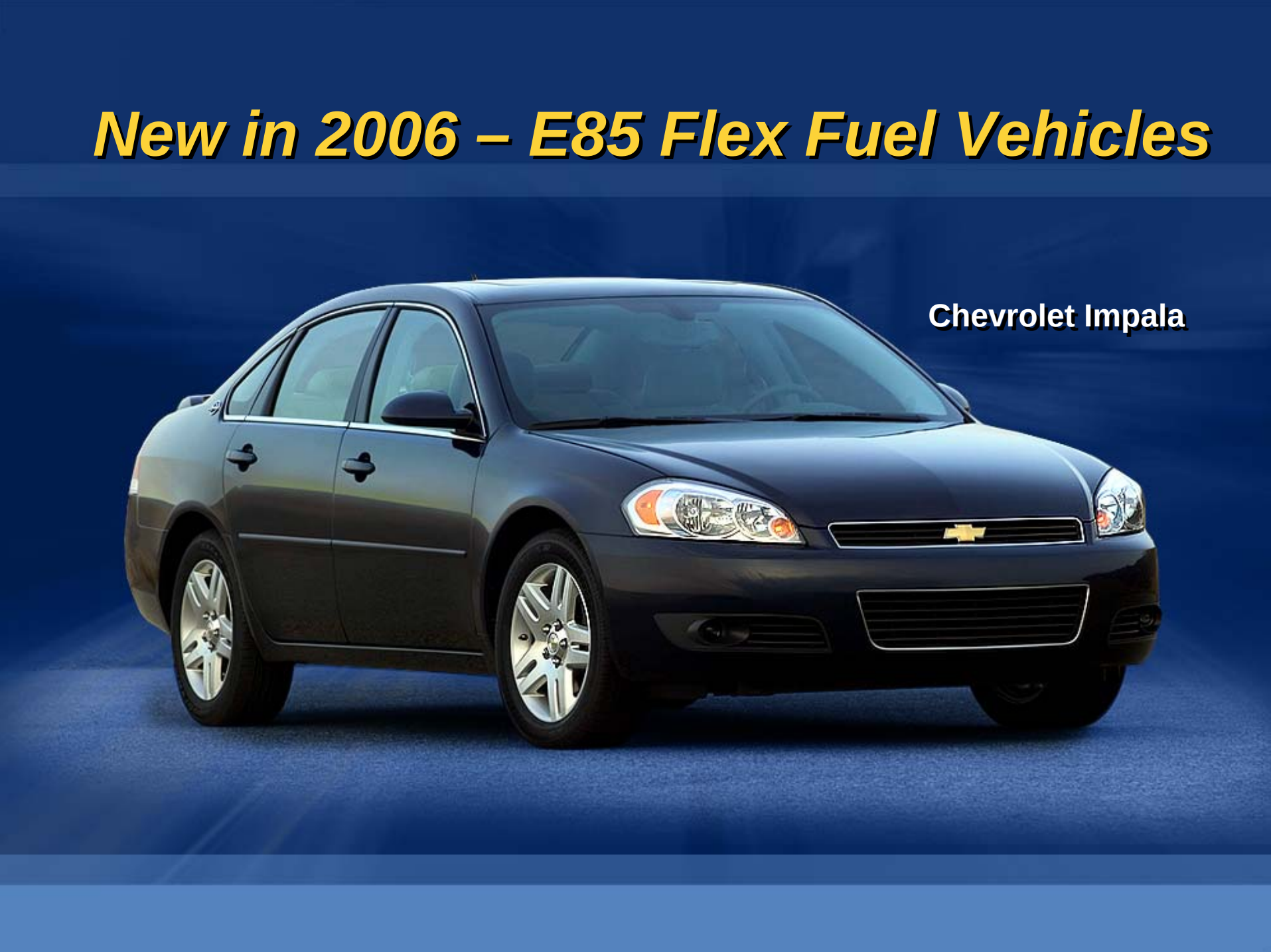
Tahoe

Silverado

Suburban

2006 GMC E85 Flex Fuel Vehicles

New in 2006 – E85 Flex Fuel Vehicles



New in 2006 – E85 Flex Fuel Vehicles

Chevrolet Monte Carlo

So what has changed?

Energy Policy Act of 2005:

- Mandates large increases in ethanol use for transportation fuels
- Provides significant incentives to help achieve these increases
- Requires EPA to quantify and manage resulting environmental impacts

Options for increased ethanol use

Two options for increased ethanol use in current U.S. fleet

- Low concentration blends (E6/E10) in conventional vehicles
  - Note: existing conventional vehicles **not** compatible with blends beyond E10
- High concentration blends (E85) in compatible variable-fuel vehicles

E10 option evaporative emissions

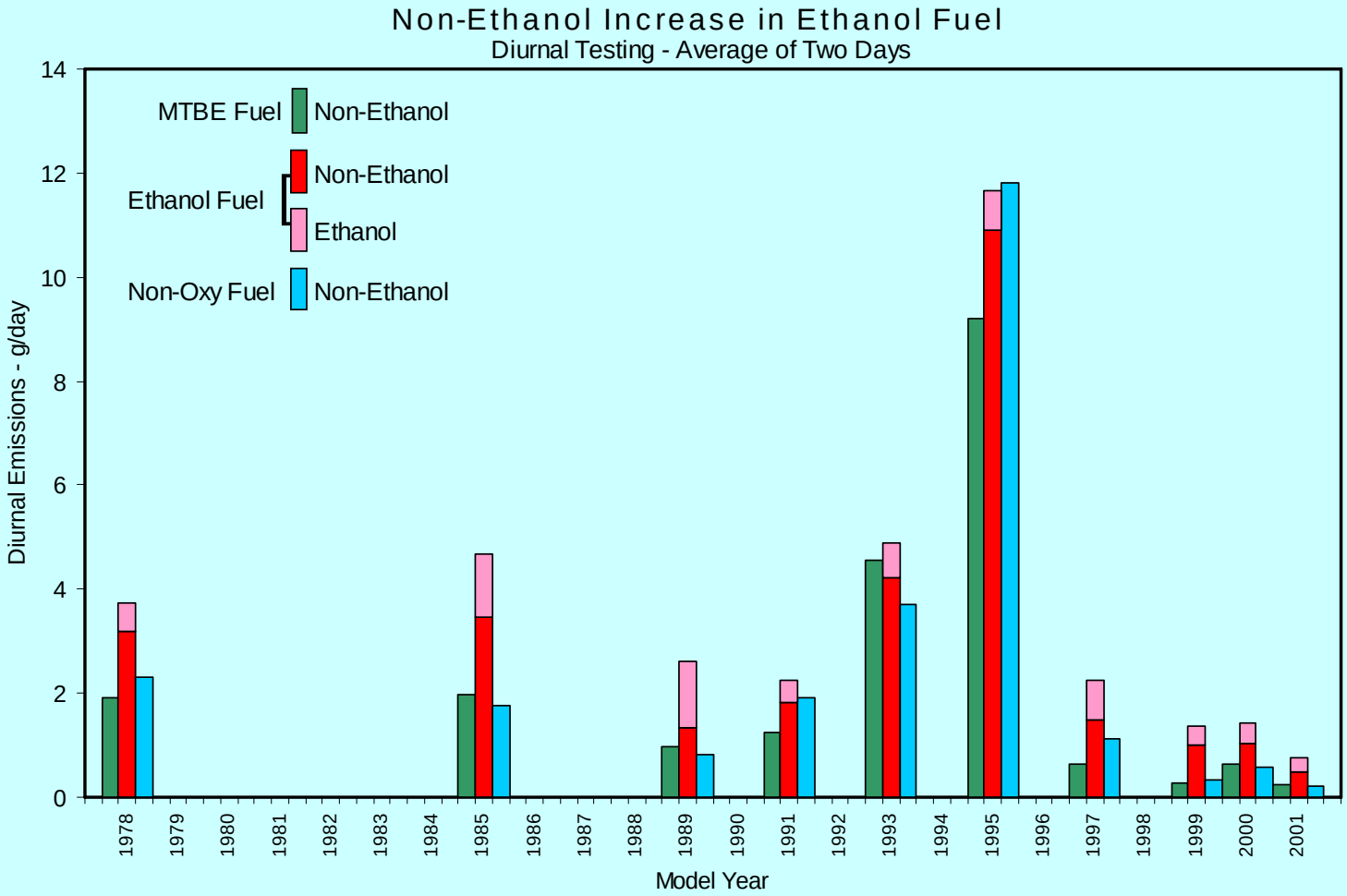
Recent focus on evaporative emissions impact of low concentration ethanol blends

- CRC E65 study commissioned by CARB due to MTBE ban and CA shift to E6
- Evaporative permeation emissions in existing fleet much higher on low concentration blends
  - Follow-on CRC E65.3 study focused on PZEVs & E85

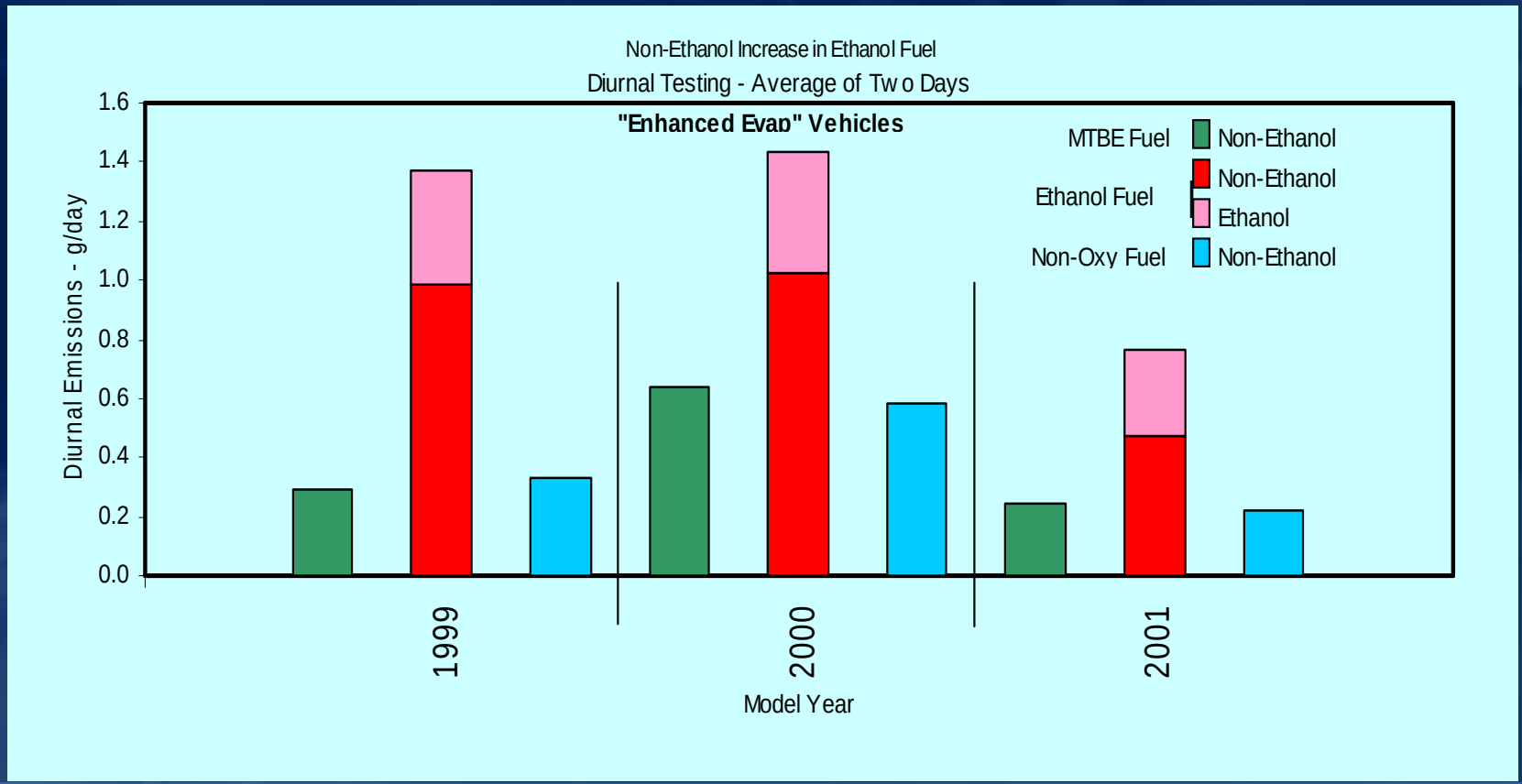
CRC E65 California fleet selection

Rig #	Model Year	Vehicle Model
1	2001	Toyota Tacoma
2	2000	Honda Odyssey
3	1999	Toyota Corolla
4	1997	Dodge Caravan
5	1995	Ford Ranger
6	1993	Chevrolet Caprice
7	1991	Honda Accord
8	1989	Ford Taurus
9	1985	Nissan Sentra
10	1978	Oldsmobile Cutlass

Evaporative emissions impact of E6



Evaporative emissions impact of E6 on enhanced evap systems



E85 option not evap compromised

E85 avoids the permeation “hit” of E10

- Low gasoline fraction in E85 limits ethanol impact on permeation
- E85 permeation characteristics similar to better than non-oxygenated gasoline
- Each gallon of E85 can displace >8 gallons of E10 or >14 gallons of E6 usage & associated evaporative emissions increases

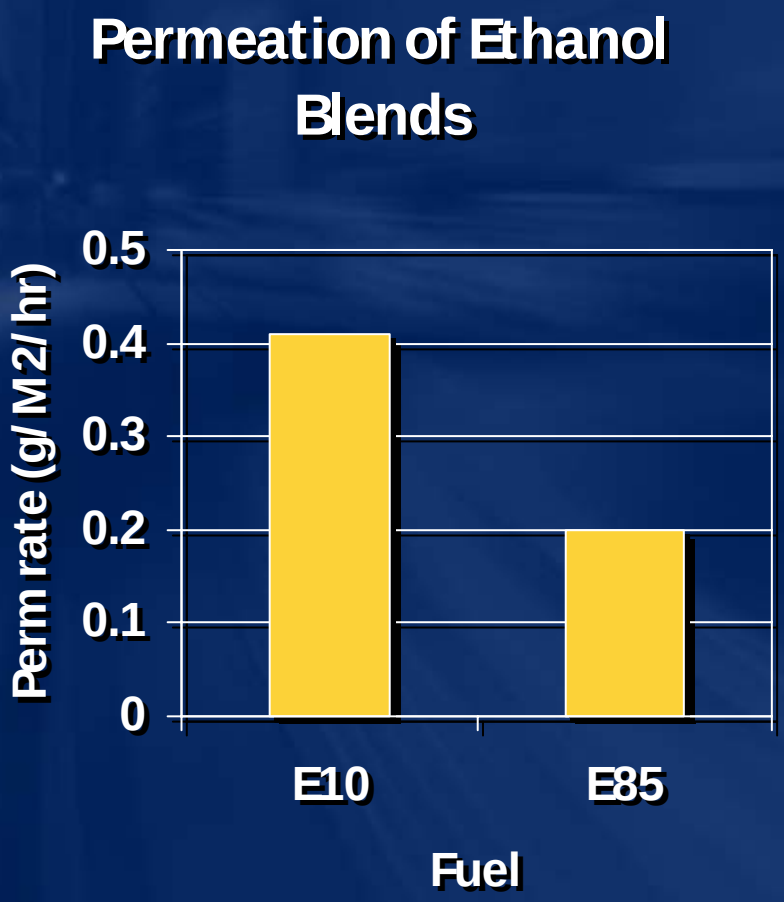
Evap impact of high concentration blends (CRC E65.3)

CRC E65.3 Results to be released June, 2006

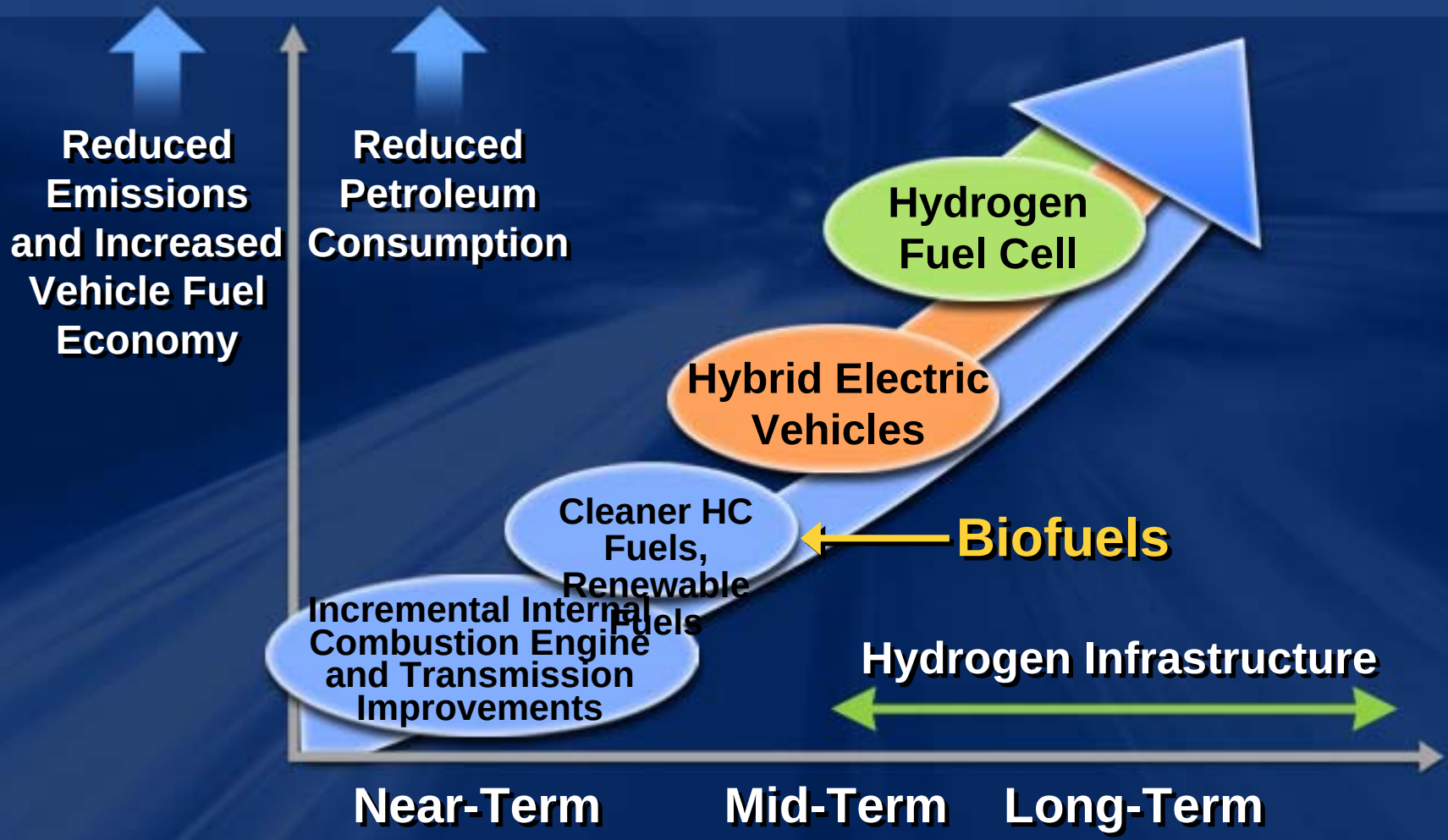
Evaporative emissions E85 vs. E10

Currently available data:

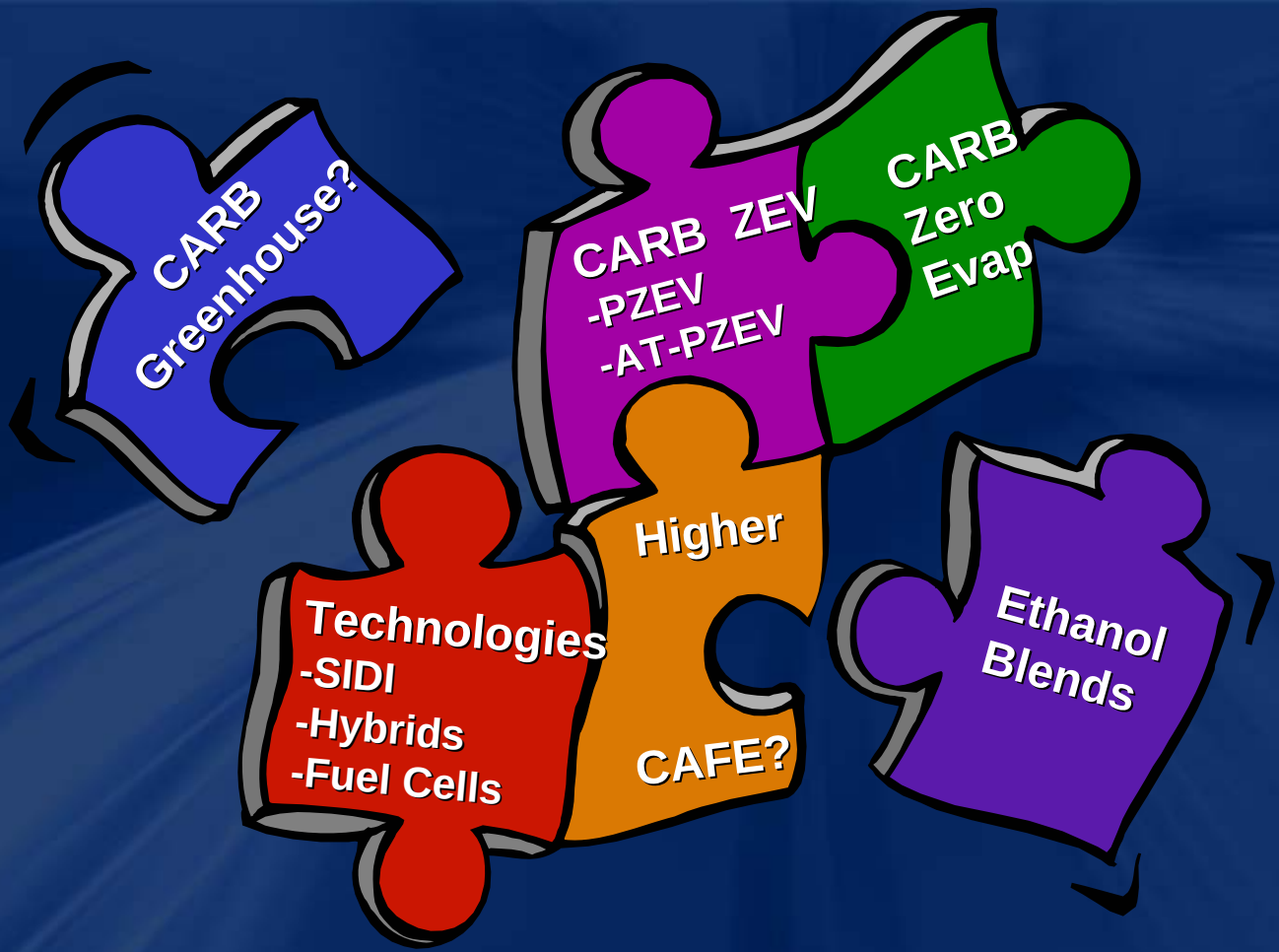
- Courtesy Harold Haskew & Associates
- Permeation data on multilayer HDPE fuel containers at 105°F
- E85 much lower than E10
- CRC E65.3 study to provide definitive vehicle data



Ethanol's role in GM's Advanced Propulsion Technology Strategy



Complex/Challenging Regulatory Landscape



Benefits of Ethanol

- Clean burning
- Renewable
- Domestically produced
- Potential to displace significant amounts of petroleum
- Greenhouse gas benefit – depends on ethanol source

Petroleum Displacement

Annual Gasoline Savings of 94 Gallons/Year

(Assumes 11,000 miles/year)*

Hybrid Compact Car
48 mpg
(EPA Adjusted Combined)

Compact Car
34 mpg
(EPA Adjusted Combined)

** Personal Transportation Study - Oak Ridge Nat. Lab Data Book*

Petroleum Displacement

Annual Gasoline Savings of 477 Gallons/Year

(Assumes 11,000 miles/year)*

E85 FFV on E85

12 mpg

(EPA Adjusted Combined)

E85 FFV on Gasoline

16 mpg

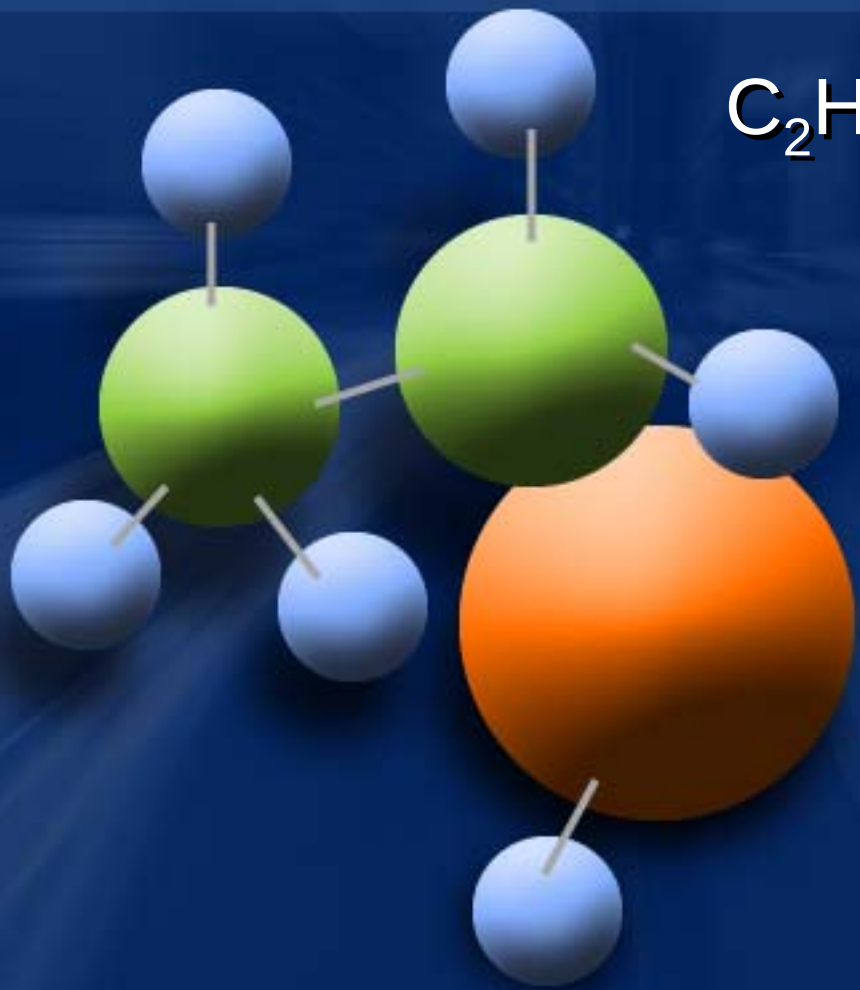
(EPA Adjusted Combined)

** Personal Transportation Study - Oak Ridge Nat. Lab Data Book*

Ethanol Potential

- 4 million U.S. E85 flex fuel vehicles
  - Fueling the 1.5 million GM vehicles could save 17 million barrels of oil annually
  - Fueling all 4 million could save 45 million barrels
- Ethanol currently represents 2.5% of fuel supply

Scientific Case for Ethanol



C_2H_5OH

GREET 1.6

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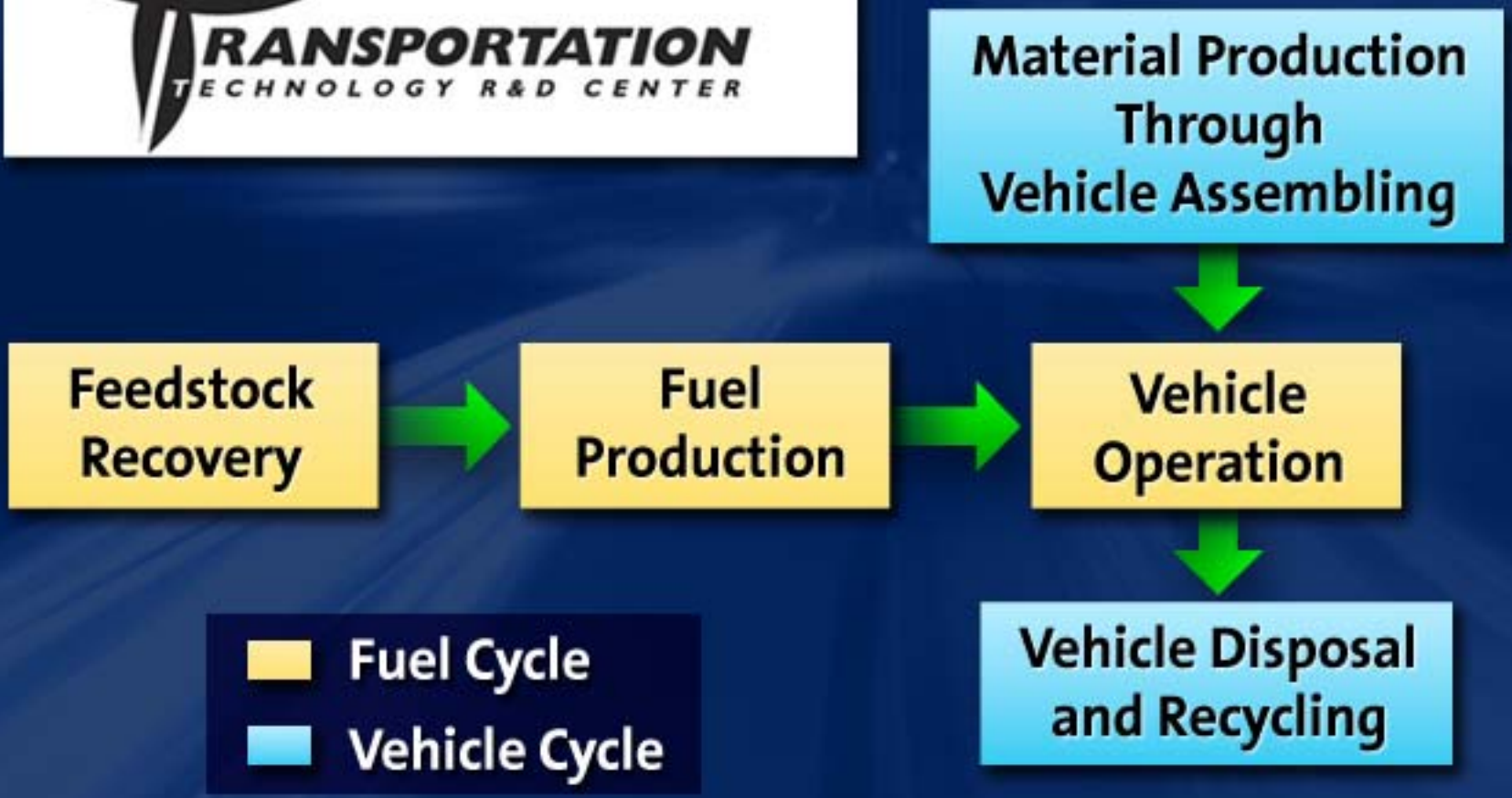
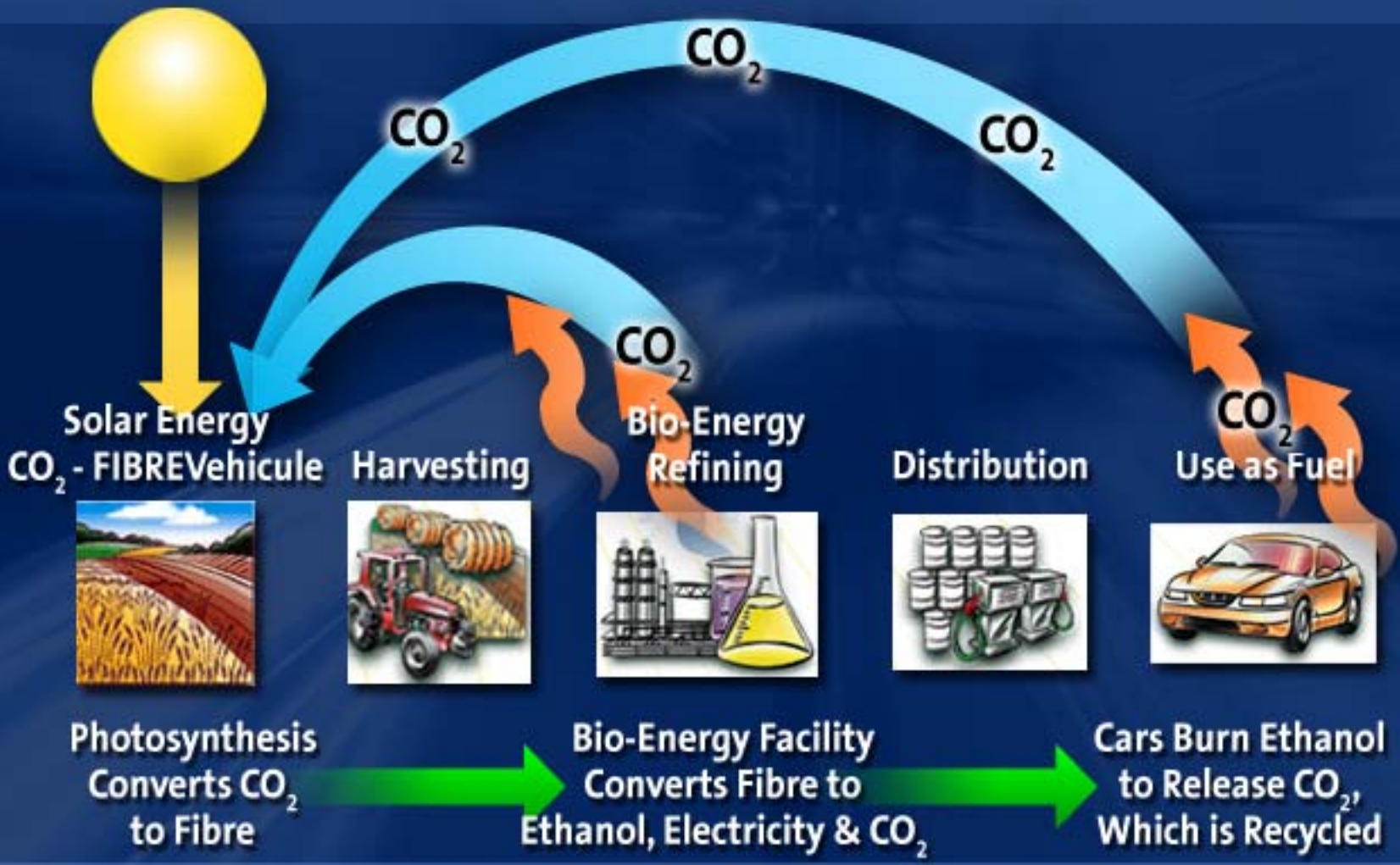


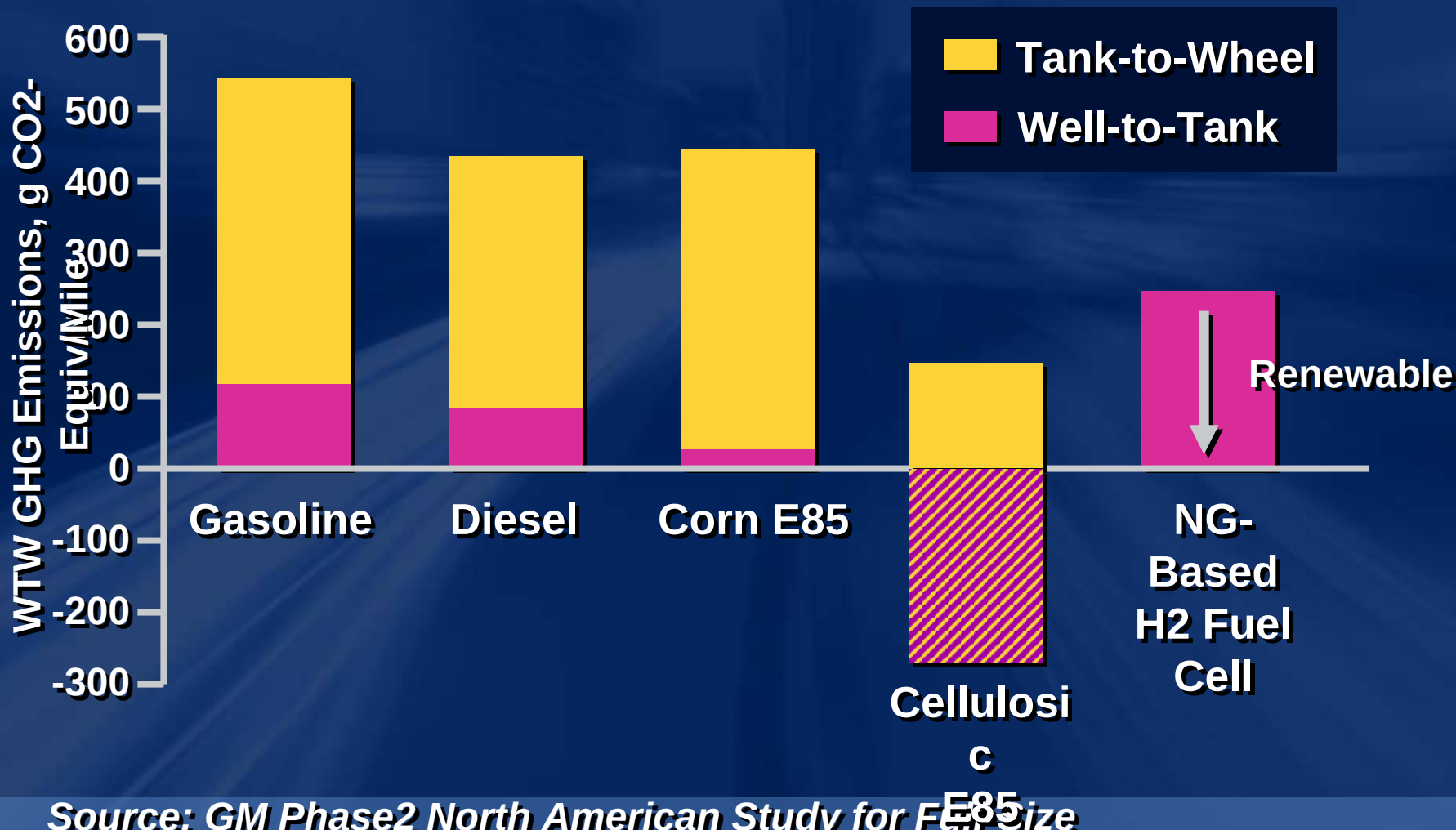
Well-to-Wheels Analysis
Petroleum System

Well-to-Tank **Tank-to-Wheels**

Well-to-Wheels Analysis
Biofuel System

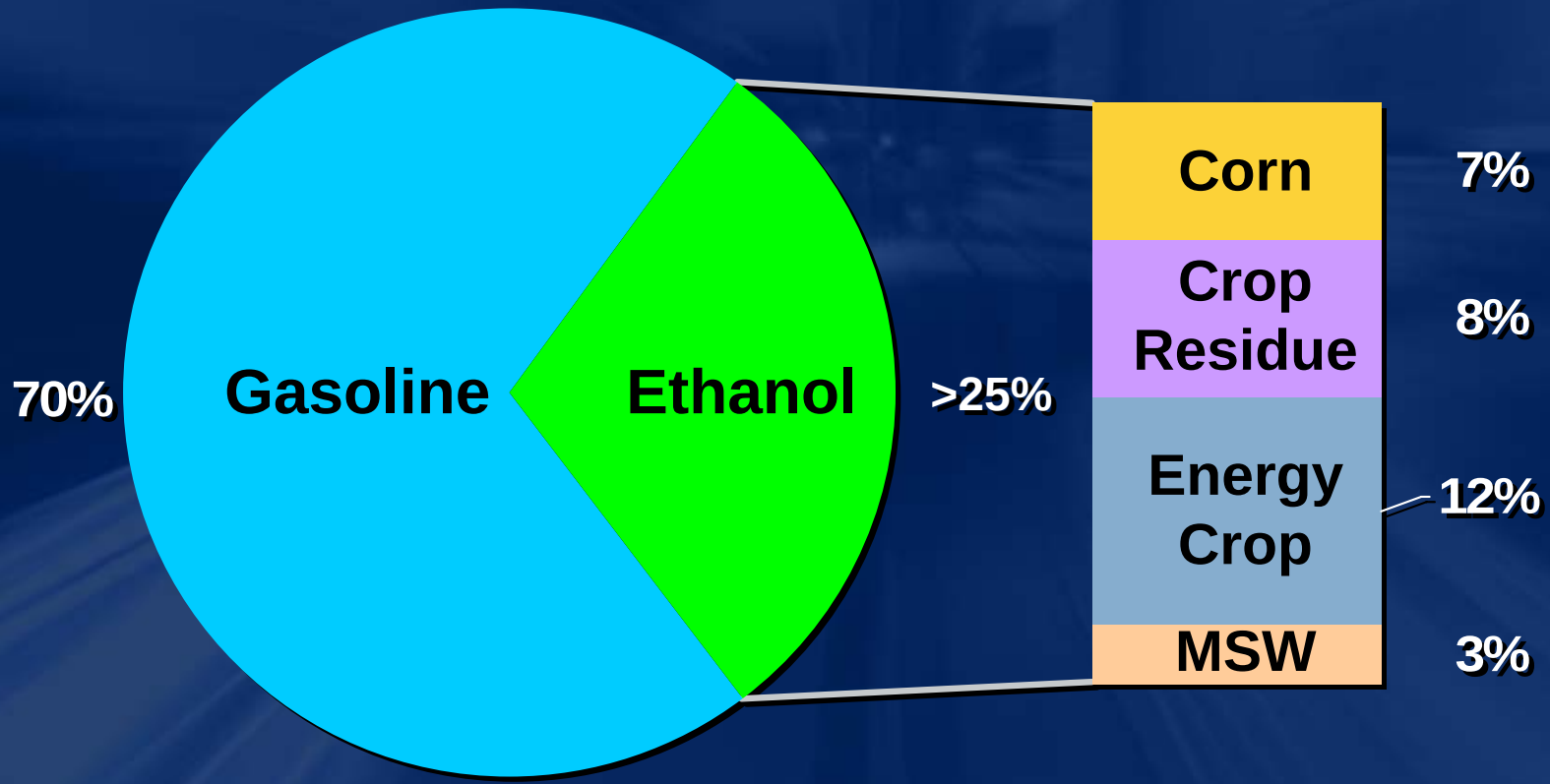


Well-to-Wheel Greenhouse Gas Emissions



Source: GM Phase2 North American Study for Full Size Pickup

Practical Estimate of Potential U.S. Ethanol Portion of U.S. Light-Duty Fuels (Year 2020)



All percentages are on an energy basis

GM's Ethanol Commitment

- Build great ethanol-powered vehicles

GM's Ethanol Commitment

- Build great ethanol-powered vehicles
- Promote the use of ethanol

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- Build great ethanol-powered vehicles
- Promote the use of ethanol
- Promote the benefits of ethanol to customers

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- Work with regulators and legislators

GM's Ethanol Commitment

- Build great ethanol-powered vehicles
- Promote the use of ethanol
- Promote the benefits of ethanol to customers
- Work with regulators and legislators
- Work toward our long term goal to remove our cars and trucks from the environmental debate